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Sep 17, 2004
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[Signature]
Tracy M. Helms

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

SATO et al.

Serial Number: 09/784,321

Group Art Unit: 1745

Filed: February 16, 2001

Examiner: Susy N. Tsang Foster

Title: MULTI-LAYER ELECTRODE STRUCTURE AND MANUFACTURING SAME

DECLARATION OF INVENTOR REGARDING "ADHESIVITY"
OF MATERIALS KNOWN IN THE ART
UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450

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Alexandria, VA 22313-1450

September 17, 2004

Sir:

I, Takaya Sato, declare and state as follows:

1. I am a joint inventor of the above-identified patent application (the "subject application").
2. I graduated from Shinshuu University where I obtained a Masters Degree in Chemistry and I also received a PhD from Kyoto University in 1992. I am employed as chief scientist at Nisshinbo Industries Inc. of Tokyo, Japan ("Nisshinbo") and have been so employed there for about 19 years. Including my employment with Nisshinbo, I have practiced as a chemist for 19 years, of which involved significant research, development and testing of electrochemistry and the polymer field and some kinds of products in the polymer and electrochemical device fields made with such technical experience. Through my experience, I have become well aware of the standards and terminology used in the battery and capacitor industry and have filed about 30 domestic patent applications in the same field of art since the year of 1985 and have had 30 patents issued in Japan in the same field of art. I have also filed 10 United States applications in the same field of art since the year of 1985 and have had 10 patents issued in the United States.
3. I have read and understand the subject application and the comments of the Examiner contained in the Final Office Action mailed 05/17/2004 and the Advisory Action sent on 8/4/2004. The examiner stated that Claims 1, 4, 34 54 and 55 are rejected under 35 U.S.A. 102(b) as being anticipated

by the JPO machine translation of JP 11-67214 A, Osawa et al. The Examiner then cites to the following specific example in Osawa for her rejection.

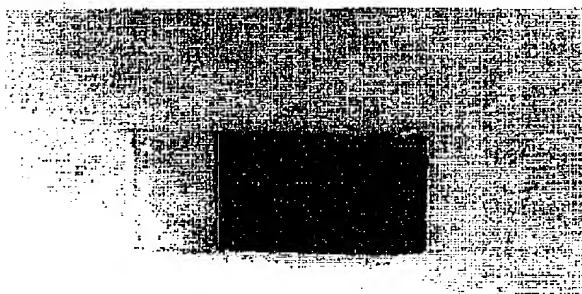
4. The Examiner cites from the Osawa translation and states "The use of polyvinylidene fluoride improves the adhesion of the first electrode layer to the current collector (see paragraph 7 of machine translation). Since polyvinylidene fluoride has a higher adhesive strength than polyaniline, the first electrode layer would have a stronger adhesive strength than the second electrode layer relative to the current collector resulting in an electrode structure having effective adhesive properties." In other words, Osawa et al. discloses the use of polyvinylidene fluoride to improve the adhesion of the first electrode layer to the current collector (see paragraph 7 of machine translation). Osawa continues to claim that since polyvinylidene fluoride has higher adhesive strength than polyaniline, the first electrode layer would have a stronger adhesive strength than the second electrode layer relative to the current collector resulting in an electrode structure having effective adhesive properties. Furthermore, Osawa states, the first electrode layer has low electrical resistance (see paragraph 9 of machine translation) and the use of a conductive polymer as a binder in the second electrode layer would give low electrical resistance to the electrode structure. Finally, Osawa et al., paragraph 7 of the machine translation states that "...consists of a polyvinylidene fluoride...since the adhesion of a positive-electrode charge collector and an active material can be improved by using a fluorine system...as a binder..." The Examiner has based her rejections of claims 1, 4, 34, 54 and 55 on Osawa for the above reasoning and Applicant contends that these rejections are incorrect.
5. Based on Applicant's experience and knowledge in the field of art,

Applicant asserts that at least Osawa's statement is NOT applicable to the present invention for the following reasons. Polyvinylidene fluoride is known to be a less-adhesive material. For example, the present application explained that the binder polymer, that easily forms fibrils, binds poorly to the current-collecting material and as such has poor bonding strength and therefore such binder polymer is used in layers other than the first electrode layer. Claim 1 of the present application states "said first electrode layer has a stronger adhesive strength than said second electrode layer relative to said current-collecting material" and therefore, the rejection of claims 1, 4, 34, 54 and 55 made by the Examiner and based on Osawa are incorrect.

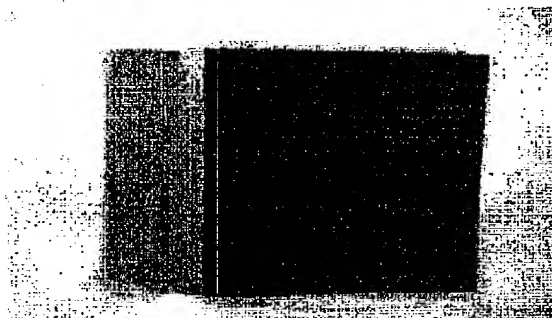
6. It is a well-known fact in the industry that polyvinylidene fluoride is a less-adhesive material and in order to show and prove this the applicant conducted experimentation and discloses the results herein. In this experiment, (Comparison 3) a first electrode was formed by polyvinylidene fluoride while a second electrode was formed by Teflon.
7. The applicant used JIS 4.15 of D0202 where it states that a cellotape is placed and adhered on an object (e.g., electrode layer formed on a surface of the current collector); an end of the cellotape is picked up so as to make a right angle between an adhesive surface of the cellotape and the surface of the object; and the cellotape was peeled off instantly.
8. Experiment

	Actual Electrode Composition (per weight)						Electrode thickness	Solvent (per weight)
	Electrode layer	Electrolyte activated carbon	Powder conducting material (carbon black)	Polymer Al	Teflon	PVdf		
Comparison 3	First	20	-	-	-	1	50	NMP (30)
	Second	20	-	-	0.5	-	230	NMP (34)

(X) Cellotape on which the peeled electrode is adhered



(Y) Electrode after being peeled off



9. As shown in the two photo copies attached hereto, it is clear that the

polyvinylidene fluoride of Osawa et al. shows less adhesiveness than that of the present invention as described in material 3 of the current specification (i.e., layers comprised of ion-conducting polymer for the first layer and Teflon for the second layer). The examiner is invited to view these photos and to compare them with FIG. 9 of the present invention. Two photos, i.e., (X) cellotape on which the peeled electrode is adhered and (Y) electrode after being peeled off, are similar to (C) in FIG. 9 of the present invention where the electrode layer has been completely peeled off from the current collector (rank "c"). See FIG. 9(C) and lines 5-7 of page 21.

10. In summary, this sworn statement clearly shows that polyvinylidene fluoride in fact tends to form fibrils and adheres poorly to the current collector and thus, has poor adhesive strength. Therefore, polyvinylidene fluoride is not a preferable material to be used on the first layer if employed in the present invention. A material that could easily fibril should and must be used on the second layer. This is a clear structural difference from Osawa et al and the present invention. The Examiner stated in the advisory action of 8/04/2004 that Osawa discloses polyvinylidene fluoride in the first electrode layer that is used to improve the adhesion of the first electrode layer to the current collector which would result in the first electrode layer having effective adhesive properties to the current collector. This is, as has been explained, incorrect because if Osawa uses the polyvinylidene fluoride the first electrode layer will NOT be more adhesive than the second layer, as is shown in the present invention. Therefore, it appears to the Applicant that Osawa is not, as state by the Examiner, an anticipatory reference.
11. The Examiner also notes in the Advisory Action that applicant's comparison of the adhesive strength of the electrode layer containing

polyvinylidene fluoride as disclosed in the JP11-67214 A reference with the adhesive strength of the electrode layer containing the ion conducting polymer binder in the specification is irrelevant because the specific ion conducting polymer binder has not been claimed.

12. On the other hand, the Applicant disagrees with the Examiner's statement that "the polyvinylidene fluoride binder in the first layer inherently becomes gelled when exposed to the nonaqueous electrolyte solution and the gelled polyvinylidene fluoride binder inherently is ion-conducting." See a paragraph on page 5 starting with "[i]nstead of a polymer electrolyte gel..." of office action dated May 17, 2004. The examiner explained that the statement is based on the machine translation of JP11-67214. However, apparently major mistranslation exists in the machine translation and the correct translation of the last 3 sentences in the paragraph 22 of JP11-67214 should be:

"A negative-electrode solution is prepared by dissolving and mixing polyvinylidene fluoride 8.5 weight part, artificial graphite (mean particle diameter of 3 micrometers) 3 weight part and natural graphite (mean particle diameter of 2 micrometers) 88 weight part as carbon materials, oxalic acid 0.5 weight part, and N-methyl pyrrolidone 50 weight part, and then the negative-electrode solution was coated on copper foil (10 micrometers in thickness) by blades to form a electrode layer with a thickness of 90 micrometers). The same items in Embodiment 1 were tested. The result appeared in Table 1 was obtained accordingly."

Here, the polyvinylidene fluoride is used as a binder (NOT ION-CONDUCTING).

13. Because of the structural differences between the present invention and the cited references, any rejection regarding claims 1, 6, 34, 54, and 56 are improper. Further, new claim 57 is dependent from claim 1 and

therefore would be allowable if claim 1 is allowable. Therefore, it is respectfully submitted that claims 1, 6, 34, 54, and 56-57 are now in condition for allowance and notice to that effect is requested.

14. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Takaya Sato
Takaya Sato

September
15, 2004
Date

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Chiba 267-0055
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